

AN OBSERVATION OF JUVENILE TIGER SHARKS FEEDING ON CLAPPER RAILS OFF THE SOUTH- EASTERN COAST OF THE UNITED STATES

JOHN K. CARLSON¹, MARK A. GRACE², AND PAUL K. LAGO³

ABSTRACT – From September to October 2000, a longline survey conducted aboard the NOAA/National Marine Fisheries Service's research vessel FERREL between Ft. Pierce, FL and Charleston, SC resulted in the capture of 72 juvenile tiger sharks, *Galeocerdo cuvier*, (mean size = 108 cm total length). Twenty-three were found to have large quantities of feathers, both contour and semiplumes, on the teeth and on the outside of the buccal area. An internal examination of 5 individuals found the remains of clapper rail, *Rallus longirostris* (100% occurrence). Since clapper rails generally inhabit coastal salt marshes and are not considered to be a migratory species, we could not positively ascertain how juvenile tiger sharks, a species normally found in offshore waters, were able to prey on this bird species. Although we cannot explain the sequence of events that brought these species together, it is possible that the birds were swept offshore by storm winds, there was a "mass exodus" from a marsh habitat due to disturbance, or perhaps a dispersal flight.

Tiger sharks, *Galeocerdo cuvier*, are a cosmopolitan species that occur in temperate and tropical waters. In the western North Atlantic, adult tiger sharks seasonally migrate north but some may reside year round off the coast of Florida (Kohler et al. 1998). Nursery grounds for juvenile tiger sharks (163-232 cm total length) are thought to occur in offshore areas off the southeast coast of the United States from Augusta, GA (~33°27'N, 81°03'W) to Daytona Beach, FL (~29°11'N, 81°03'W) (Natanson et al. 1999).

The diet of the tiger shark has received a great deal of attention, and in general, they are opportunistic feeders preying on teleosts, elasmobranchs, birds, turtles, reptiles, mammals, and discarded rubbish (Dodrill and Gilmore 1978, Gudger 1949, Lowe et al. 1996, Randall 1992). Further, evidence suggests that ontogenetic shifts in diet do occur with small tiger sharks feeding primarily on teleosts, and larger individuals feeding on birds and turtles (Lowe et al. 1996).

From 13 September through 2 October 2000 and from 9 October through 16 October 2000, a longline survey designed to determine the

¹ NOAA/National Marine Fisheries Service, Southeast Fisheries Science Center, 3500 Delwood Beach Rd, Panama City, FL 32408; john.carlson@noaa.gov. ² NOAA/National Marine Fisheries Service, Southeast Fisheries Science Center, P.O. Box 1207, Pascagoula, MS 39568; mark.a.grace@noaa.gov. ³ Biology Department, University of Mississippi, University, MS 38677; plago@olemiss.edu.

distribution and abundance of coastal species of sharks was conducted aboard the NOAA/National Marine Fisheries Service's research vessel FERREL. Details on the survey design can be found in Grace and Henwood (1997). During this survey, 72 juvenile tiger sharks (mean size = 108 cm total length) were captured between Ft. Pierce, FL (27°57.1'N, 80°16.2'W) and Charleston, SC (33°04.6'N, 78°03.1'W) (Grace 2000), from 16.7 and 92.6 kilometers offshore (Fig. 1). Although all tiger sharks captured ($n = 72$) were not examined, an external inspection of 23 of 26 individuals captured between 31°41.6'N, 80°36.2'W and 33°04.6'N, 78°03.1'W by the senior author revealed the presence of large quantities of feathers, both contour and semiplumes, on the teeth and on the outside of the buccal area. In some instances, tiger sharks regurgitated large amounts of feathers as they were processed for biological examination. All contour feathers were similar in color and shape indicating that they could have come from the same types of birds. The stomachs of 5 randomly chosen euthanized individuals (mean size = 101 cm total length) were removed for further examination (Table 1). In all stomachs, remains of clapper rails, *Rallus longirostris*, (mean weight = 98.5 g) were found (100% occurrence). Bird remains found internally matched remains that were found externally suggesting all of these sharks fed upon the same species of bird.

The tiger shark has been reported to feed on several terrestrial bird species. For example, remains of yellow-billed cuckoo, *Coccyzus americanus*, Bahama yellowthroat, *Geothlypis rostrata*, mourning

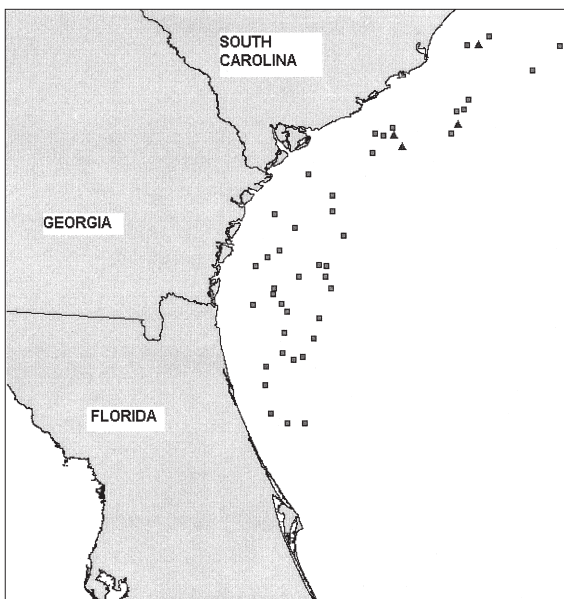


Figure 1. Locations where tiger sharks were captured (■) and where tiger sharks were found feeding on clapper rails based on stomach analysis (▲).

dove, *Zenaida macroura*, and wood thrush, *Hylochicla mustelina* were found in 5 of 15 tiger shark stomachs captured off Melbourne Beach, FL (Dodrill and Gilmore 1978). The presence of these birds in the stomachs was suggested to be due to unsuccessful migratory flights as the bird remains were found only during spring and fall. However, clapper rails generally inhabit coastal salt marshes, are not considered to be migratory species (although some more northerly populations along the Atlantic coast will move south to some extent during winter months), are not commonly observed in open water far from their marsh habitats and are actually quite reluctant to fly (Bent 1926, Eddleman and Conway 1998). The species does occur throughout the Caribbean islands (Ripley 1976), so dispersal flights or displacements across the ocean must occur on occasion.

The question then becomes; how did so many clapper rails come in contact with so many juvenile tiger sharks? One rail could be considered a random event, but these sharks were all eating clapper rails. Perhaps the sharks were feeding much closer to shore than has been previously noted, but this does not explain how they were able to prey on typically terrestrial, non-migratory birds. Additionally, the bird carcasses were in reasonably good shape and the presence of feathers on the teeth and on the outside of the buccal area would seem to indicate that feeding activity probably occurred near the capture site of the sharks. It is unlikely the tiger sharks consumed the birds near shore because tiger sharks have not been reported in low salinity, estuarine conditions and many of these feathers would have been washed off during their swim out to the sampling area. While it is possible that the birds could be swept offshore by winds, no particular storm event occurred immediately prior to the sampling period. A random "mass exodus" from a marsh habitat due to disturbance, or perhaps a dispersal flight, might be a possibility, but it seems unlikely the birds would fly any distance out over the ocean if other marshes were at hand. Equally possible is some "mass death" event (a result of disease, etc.) that resulted in many corpses floating out to sea. At present, we have no evidence supporting any of these hypotheses.

Table 1. Location, date, depth, and size of tiger sharks euthanized for stomach analysis.

Shark number	Shark total length (cm)	Date captured	Latitude/ Longitude	Gear depth (meters)
1	111.5	10/12/2000	3218.1/7927.4	34.7
2	91	10/14/2000	3320.2/7837.7	21.9
3	103	10/12/2000	3225.5/7932.3	25.5
4	99.5	10/13/2000	3231.7/7850.9	42.0
5	102.5	10/13/2000	3231.7/7850.9	42.0

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